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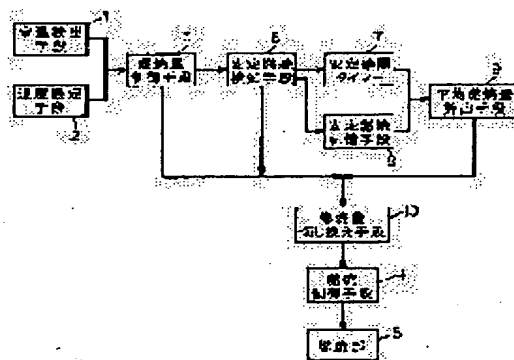
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(54) COMBUSTION CONTROL DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To reset an optimum combustion rate to a room without increasing cost and eliminate variations in the combustion rate in the case of a degraded accuracy of the resolution of a room temperature thermistor, if the amount of combustion is unsteady for a definite time within some range of the combustion rate.

SOLUTION: A combustion control device is designed to store a combustion rate per unit time with a stable combustion memory means 8 if combustion stability is confirmed with a stable combustion detection means 6 and to compute the average combustion rate during stable combustion with an average combustion rate computation means at the point of time when a preliminarily determined stability confirmation timer 7 overflows and to switch over the combustion rate of the average combustion rate by a combustion rate switchover means 10 from the combustion rate determined with a combustion rate control means 3 based on a room temperature and a setting temperature, thereby forming the structure of increased combustion steps and an appropriate combustion rate can be decided to eliminate the fluctuation.



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CLAIMS

[Claim(s)]

[Claim 1] The combustion control system characterized by providing the following The combustion section which burns fuel A room temperature detection means to detect indoor temperature A temperature setting means to set up desired temperature The amount control means of combustion which switch the amount of combustion to two or more steps by making into an input signal the difference of the room temperature detected by the aforementioned room temperature detection means, and the setting temperature beforehand set up by the aforementioned setting temperature means, A stable-combustion detection means to detect that the amount of combustion determined by the aforementioned amount control means of combustion has burned within the amount range of combustion set up beforehand (this is henceforth called stable combustion), The stable check timer which clocks the period which the stable combustion detected with the aforementioned stable-combustion detection means is continuing, A stable-combustion storage means to memorize the amount of combustion per unit time in the aforementioned stable-combustion period, An amount calculation means of average combustion will compute the amount of average combustion in stable combustion based on the information on the aforementioned stable-combustion storage means if time progress is carried out by which the aforementioned stable check timer was set up beforehand, Until the amount of combustion determined by the aforementioned amount control means of combustion exceeds the amount range of combustion set up beforehand, after inputting the calculation result of the amount of average combustion from the aforementioned amount calculation means of average combustion The amount switch means of combustion which switches the amount of combustion to the amount of average combustion, and a combustion-control means to control the amount of combustion of a burner according to the amount of combustion which switched by the aforementioned amount switch means of combustion, and was inputted

[Claim 2] The combustion control system characterized by providing the following The combustion section which burns fuel A room temperature detection means to detect indoor temperature A temperature setting means to set up desired temperature The amount control means of combustion which switch the amount of combustion to two or more steps by making into an input signal the difference of the room temperature detected by the aforementioned room temperature detection means, and the setting temperature beforehand set up by the aforementioned setting temperature means, A stable-combustion detection means to detect that the amount of combustion determined by the aforementioned amount control means of combustion has burned within the amount range of combustion set up beforehand (this is henceforth called stable combustion), The stable check timer which clocks the period which the stable combustion detected with the aforementioned stable-combustion detection means is continuing, A stable-combustion storage means to memorize the amount of combustion per unit time in the aforementioned stable-combustion period, An amount calculation means of average combustion will compute the amount of average combustion in stable combustion based on the information on the aforementioned stable-combustion storage means if time progress is carried out by which the aforementioned stable check timer was set up beforehand, An amount range calculation means of average combustion compute the amount range of average combustion containing the aforementioned amount of average combustion, the amount switch means of combustion which switches the amount of combustion to the lower limit of the amount range of average combustion, and a combustion-control means control the amount of combustion of a burner according to the amount of combustion which switched by the aforementioned amount switch means of combustion, and was inputted

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the combustion control system used for a petroleum warm air circulator etc.

[0002]

[Description of the Prior Art] Conventionally, this kind of petroleum heating machine is constituted as shown in drawing 9. That is, in drawing 9, 1 is a room temperature detection means to detect the temperature of the heated interior of a room, and 2 is a temperature setting means to set up desired temperature. 3 is the amount control means of combustion which switch the amount of combustion to two or more steps according to the difference of the room temperature detection means 1 and the temperature setting means 2.

[0003] For example, when setting temperature is 20 degrees C, if a room temperature is 21 degrees C, if a room temperature is 18 degrees C, the amount of combustion will be switched to weak combustion at strong combustion. Moreover, the combustion section 5 is controlled by the combustion control means 4 based on the output of the amount control means 3 of combustion etc.

[0004]

[Problem(s) to be Solved by the Invention] However, according to the above-mentioned conventional composition, in the case of the room temperature thermistor which precision of the resolution of a room temperature thermistor can detect by the low case, for example, 0.5-degree-C serration, the combustion number of stages (number of stages which can be stabilized by combustion) actually determined with a room temperature and setting temperature though there are 256 steps of combustion number of stages in from strong combustion before weak combustion can have only six steps. In this case, the following phenomena may occur:

[0005] Since a room temperature will rise if combustion is continued in a certain amount of combustion, the amount of combustion is switched one-step weakness. Then, if combustion is continued in the weaker amount of combustion, shortly, a room temperature falls and the amount of combustion must be switched one-step strength. Then, when combustion is continued in the stronger amount of combustion, it may repeat that a room temperature rises and the amount of combustion must be switched one-step weakness shortly.

[0006] When the above-mentioned phenomenon happens, even if it passes till when, a room temperature is not stabilized at setting temperature, but a room temperature may also be said that a temperature change will be in an unpleasant large state. Moreover, since the rotational frequency of a fan motor was also confused according to the switch of the amount of combustion, there was a fault of being noisy. Although the number of stages which can be stabilized by combustion can be increased if the precision of resolution uses a better room temperature thermistor in order to avoid this, there is a fault of carrying out a cost rise.

[0007] By this invention's solving the above-mentioned fault, and increasing the number of stages which can be stabilized by combustion, without carrying out a cost rise, and determining the optimal amount of combustion to the room, wandering of the amount of combustion is lost and it aims at offering the stability of a comfortable room temperature.

[0008]

[Means for Solving the Problem] this invention in order to attain the above-mentioned purpose in the first invention A stable-combustion detection means to detect that the amount of combustion determined by the aforementioned amount control means of combustion has burned within the amount range of combustion set up beforehand, The stable check timer which clocks the period which the stable combustion detected with the aforementioned stable-combustion detection means is continuing, A stable-combustion storage means to memorize the amount of combustion per unit time in the aforementioned stable-combustion period, An amount calculation means of average combustion will

compute the amount of average combustion in stable combustion based on the information on the aforementioned stable-combustion storage means if time progress is carried out by which the aforementioned stable check timer was set up beforehand, The amount switch means of combustion which switches the amount of combustion to the amount of average combustion is prepared until the amount of combustion determined by the aforementioned amount control means of combustion exceeds the amount range of combustion set up beforehand, after inputting the calculation result of the amount of average combustion from the amount calculation means of average combustion.

[0009] Moreover, [0010] [be / the thing have a means to prepare an amount range calculation means of average combustion to compute the amount range of average combustion containing the aforementioned amount of average combustion, and to switch the amount of combustion to the lower limit of the amount range of average combustion in the amount switch means of combustion of the first invention / at the same time it attains the above-mentioned purpose in the second invention / it is what added improvement and / it]

[Function] If time progress is carried out, since [which computes the amount of average combustion in stable combustion, and switches the amount of combustion to the amount of average combustion compulsorily] the aforementioned stable check timer was beforehand set up by the first invention by the above-mentioned composition, the amount of combustion will not be unsteady between a certain combustion number of stageses forever, and this invention will determine the optimal amount of combustion to the room. Moreover, in addition to the first invention, in the second invention, the amount of combustion in stable combustion is surely made below into the amount of average combustion.

[0011]

[Example] The example of this invention is explained based on a drawing below. The same portion as the conventional example carries out the account of ** of the same number, omits explanation, and explains a different portion.

[0012] In the first invention, the amount of combustion as which 6 was determined in drawing 1 by the aforementioned amount control means 3 of combustion is a stable-combustion detection means to detect having burned within the amount range of combustion set up beforehand. 7 is the stable check timer which clocks the period which the stable combustion detected with the aforementioned stable-combustion detection means 6 is continuing. 8 is a stable-combustion storage means to memorize the amount of combustion per unit time in the aforementioned stable-combustion period. 9 is an amount calculation means of average combustion will compute the amount of average combustion in stable combustion based on the information on the aforementioned stable-combustion storage means 8 if time progress is carried out by which the aforementioned stable check timer 7 was set up beforehand. 10 is an amount switch means of combustion to switch the amount of combustion to the amount of average combustion until it exceeds the amount range of combustion when the amount of combustion determined by the aforementioned amount control means 3 of combustion computes the aforementioned amount of average combustion, after inputting the calculation result of the amount of average combustion from the aforementioned amount calculation means 9 of average combustion. The combustion-control means 4 is controlling the combustion section 5 based on the output of this amount switch means 10 of combustion, or the aforementioned amount control means 3 of combustion etc.

[0013] Next, operation of this example constituted as mentioned above is explained using the flow chart of drawing 2 . In drawing 2 , the amount of combustion (it considers as the amount of the present combustion hereafter) is first computed at Step 20 at the amount control means 3 of combustion by the output signal of the room temperature detection means 1 and the temperature setting means 2. Next, it judges whether it is amount within the limits of combustion to which the amount of the present combustion was beforehand set at Step 21 with the stable-combustion detection means 6. If out of range, the stable check timer 7 will be reconfigured at Step 27, and it will move to Step 28. If it is amount within the limits of combustion, and will judge whether the stable check timer is carrying out overflow (it is described as Following OVF) OVF and will not OVF at Step 22, it moves to Step 23. If it is OVF(ing), at Step 25, by the amount calculation means 9 of average combustion, the amount of average combustion in a stable-combustion period is computed based on the information on the stable-combustion storage means 8, and in order to control in the amount of average combustion computed not at the amount of the present combustion but at the step 25 by Step 26 henceforth, by the amount switch means 10 of combustion, the amount of combustion will be switched and it will move to Step 28.

[0014] Next, the stable check timer 7 is clocked at Step 23, and the amount of combustion per unit time in a stable-combustion period is memorized by the stable-combustion storage means 8 at Step 24. Next, combustion is controlled by Step 28 by the combustion-control means based on the amount of the present combustion, or the amount of average combustion.

[0015] The following operation is explained using the flow chart of drawing 3 and drawing 4 as the

above-mentioned example.

[0016] First, as an example, when the combustion number of stageses (number of stages which can be stabilized by combustion) determined with a room temperature and setting temperature while there are 256 steps of combustion number of stageses from strong combustion to weak combustion are six number of stageses, the amount range of combustion set up beforehand explains the case of the 3rd step of range from the 2nd step in six steps. In this case, the 2nd step will be called amount of upper limit combustion, and the 3rd step will be called amount of minimum combustion.

[0017] In the first invention, the amount of combustion (it considers as the amount of the present combustion hereafter) is first computed at Step 30 in drawing 3 and drawing 4 at the amount control means 3 of combustion by the output signal of the room temperature detection means 1 and the temperature setting means 2. Next, Step 31 compares the amount of the present combustion, and the amount of upper limit combustion. By the result of this comparison, it detects whether stable combustion is carried out.

[0018] In the case of "the amount of amount of the present combustion > upper limit combustion", it is judged from the 2nd step that there is no amount of the present combustion into the amount of the 3rd step of combustion. The amount of the present combustion itself is set up as a new amount of upper limit combustion at Step 32, and it is the inside of two steps of the new amounts of combustion (for example, when the amount of the present combustion is the 1st step) at Step 33. In order to check whether a predetermined time and the amount of combustion are stabilized in two stages which make the 1st step the amount of upper limit combustion, and make the 2nd step the amount of minimum combustion, the stable check timer 7 is started. At this time, since it is "the amount of amount of the present combustion = upper limit combustion", the amount maintenance timer of upper limit combustion which counts the time which has burned in the amount of upper limit combustion in Step 34 is started, and it moves to Step 46.

[0019] When it is judged as "the amount of amount of the present combustion ≤ upper limit combustion" at Step 31, at Step 35, the amount of the present combustion judges whether it is contained in the amount of the 3rd step of combustion from the 2nd step, and if not contained The new amount of upper limit combustion is set up at Step 36, and it is the inside of two steps of the new amounts of combustion (for example, when the amount of the present combustion is the 5th step) at Step 37. In order to check whether a predetermined time and the amount of combustion are stabilized in two stages which make the 4th step the amount of upper limit combustion, and make the 5th step the amount of minimum combustion, the stable check timer 7 is started. Furthermore, the amount maintenance timer of upper limit combustion is reconfigured at Step 38, and it moves to Step 46.

[0020] When it is judged that the amount of the present combustion is contained in the amount of the 3rd step of combustion from the 2nd step at Step 35, at Step 39, the count of the amount maintenance timer of upper limit combustion is made to stop, and it judges whether the stable check timer 7 is overflowing at Step 40. It moves to the oak step 46 which is not overflowed to the oak step 44 currently overflowed.

[0021] When it is judged as "the amount of amount of the present combustion = upper limit combustion", it is Step 31, and it judges whether the stable check timer 7 is overflowing at Step 41, and the amount maintenance timer of upper limit combustion is counted up at the oak step 42 which is not overflowed, and it moves to Step 46. Count-up of the amount maintenance timer of upper limit combustion is stopped at the oak and Step 43 which are overflowed, and the time ratio of the stable check timer 7 and the amount maintenance timer of upper limit combustion is computed by operation part 12 at Step 44 (the amount of average combustion in a stable period is calculated).

[0022] Next, it continues being stabilized within the amount of the 3rd step of combustion, for example from the 2nd step, and the case where the stable check timer 7 overflows is explained.

[0023] drawing 4 -- setting -- Step 45 -- it is -- for example, a calculation result -- "... upper limit combustion -- when it is amount maintenance timer < stable check timer $\times 1/4$ ", during predetermined stable check time, it judges that most amounts of the present combustion were the amounts of the 3rd step of combustion among the amounts of the 2nd step and the 3rd step of combustion, and the amount of the 3rd step of combustion is set up as a new amount of combustion with the amount switch means 10 if -- "... upper limit combustion -- when it is amount maintenance timer < stable check timer $\times 2/4$ ", the amount of combustion of "(the 2nd step of 3rd [+] step) $\times 3 / 4$ " is set up as a new amount of combustion with the amount switch means 10 of combustion from the time ratio if -- "... upper limit combustion -- when it is amount maintenance timer < stable check timer $\times 3/4$ ", the amount of combustion of "(the 2nd step of 3rd [+] step) $\times 2 / 4$ " is set up as a new amount of combustion with the amount switch means 10 of combustion from the time ratio if -- "... upper limit combustion -- when it is amount maintenance timer < stable check timer $\times 4/4$ ", the amount of combustion of "(the 2nd step of 3rd [+] step) $\times 1 / 4$ " is set up as a new amount of combustion with the amount switch means 10 of combustion from the time ratio if -- "... amount maintenance timer of upper limit combustion = -- when it is stable check timer $\times 4/4$ ", it judges that the

amount of the present combustion was the amount of the 2nd step of combustion all the time, and the amount of the 2nd step of combustion is set up as a new amount of combustion with the amount switch means 10 of combustion

[0024] Next, based on the amount of combustion set up by Step 46 with the amount control means 3 of combustion, or the amount switch means 10 of combustion, combustion is controlled by the combustion-control means 4.

[0025] When according to the first example of the above the amount of the 3rd step of combustion is repeated with the 2nd step and a stable check timer overflows The 2nd step and not only the 3rd step but conventionally, the amount of average combustion in a stable period is calculated, and the amount of combustion is switched to the 2.25th step of combustion number of stages, the 2.5th step, or the 2.75th step that was never able to be stabilized with composition, and since stable combustion can be carried out, the number of stages which can be stabilized by combustion can be referred to as having increased. Since the amount of combustion which did not say that the amount of combustion was unsteady forever as a result, and moreover divided even the 3rd step into four equally from the 2nd step can newly be determined, it becomes possible to choose the optimal amount of combustion.

[0026] However, although "judgment whether the amount of the present combustion is contained in the amount of the 3rd step of combustion from the 2nd step" is used as a stable-combustion detection means in the case of the first example of the above When setting temperature is changed, in order for the amount of combustion to switch and to exceed the amount range of the 3rd step of combustion from the 2nd step, even if it uses "change of setting temperature" as a stable-combustion detection means, the same effect as the above is acquired.

[0027] Next, the example of the second invention is explained based on a drawing. The same portion as the conventional example carries out the account of ** of the same number, omits explanation, and explains a different portion.

[0028] In drawing 5, it is an amount range calculation means of average combustion to compute the amount range of average combustion in which 11 contains the amount of average combustion in addition to drawing 1, and 10 is the amount switch means of combustion which switches the amount of combustion to the lower limit of the amount range of average combustion.

[0029] Next, operation of this example constituted as mentioned above is explained using the flow chart of drawing 6.

[0030] In drawing 6, when the stable check timer is overflowing at Step 22 in addition to drawing 2, while computing the amount of average combustion in stable combustion at Step 25, at Step 251, the amount range of average combustion containing the amount of average combustion is computed, and it switches to the minimum of the amount range of average combustion which calculated the amount of combustion at Step 251 by Step 26 by the amount range calculation means 11 of average combustion.

[0031] Next, the following is explained as a concrete example of the second invention. In drawing 7 and drawing 8, when the amount of average combustion of the amount of the 3rd step of combustion is computed with the 2nd step at Step 45 in addition to drawing 3, suppose that it was the 2.5th step. In this case, if the amount range of average combustion is computed with the 2.75th step from the 2.25th step by the amount range calculation means 11 of average combustion at Step 451 in addition to drawing 3, the 2.75th step will be set up as a new amount of combustion at Step 452.

[0032] Since according to the second example of the above eye 2.75 stages [a little] smaller than it is compulsorily set up as a new amount of combustion even if the amount of average combustion is computed with the 2.5th step when the amount of combustion is stable, the energy-saving effect is expectable.

[0033]

[Effect of the Invention] As explained above, since the combustion number of stages which can be stabilized without carrying out a cost rise can be increased and the optimal amount of combustion to the room can be determined, according to the combustion control system of this invention, wandering of the amount of combustion is lost by first invention. Moreover, it is lost that the rotational frequency of a fan motor is also confused according to it.

[0034] In the second invention, since it is set as the weaker amount of combustion a little by the inside of stable combustion in addition to the first invention, the energy-saving effect is also expectable.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the combustion control system in the first example of this invention

[Drawing 2] The flow chart of the combustion control system in the first example of this invention

[Drawing 3] The concrete flow chart of the combustion control system in the first example of this invention

[Drawing 4] The flow chart which shows a continuation of the flow chart of this drawing 3

[Drawing 5] The block diagram of the combustion control system in invention of ****

[Drawing 6] The flow chart of the combustion control system in invention of ****

[Drawing 7] The concrete flow chart of the combustion control system in invention of ****

[Drawing 8] The flow chart which shows a continuation of the flow chart of this drawing 7

[Drawing 9] The block diagram showing the control unit of the conventional warm air circulator

[Description of Notations]

- 1 Room Temperature Detection Means
- 2 Temperature Setting Means
- 3 The Amount Control Means of Combustion
- 4 Combustion Control Means
- 5 Combustion Section
- 6 Stable Combustion Detection Means
- 7 Stable Check Timer
- 8 Stable Combustion Storage Means
- 9 The Amount Calculation Means of Average Combustion
- 10 The Amount Switch Means of Combustion
- 11 The Amount Range Calculation Means of Average Combustion

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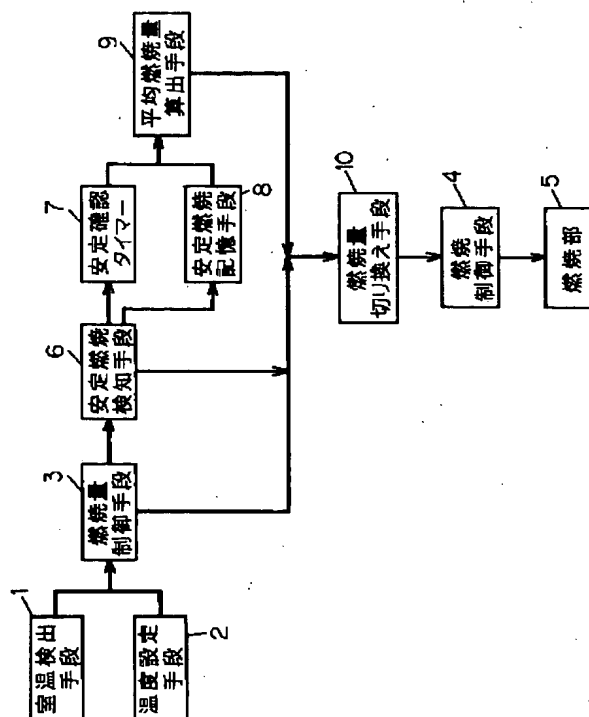
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(54)【発明の名称】 燃焼制御装置

(57)【要約】

【目的】 室温サーミスタの分解能の精度が悪い場合、一定時間、燃焼量がある燃焼量範囲でふらついている場合に、コストアップすることなくその部屋に最適な燃焼量を再設定し燃焼量のふらつきをなくする。

【構成】 燃焼制御装置は、安定燃焼検知手段6より安定燃焼中であることが確認されたら、単位時間あたりの燃焼量を安定燃焼記憶手段8により記憶しておき、あらかじめ設定された安定確認タイマー7がオーバーフローした時点で平均燃焼量算出手段9により安定燃焼中の平均燃焼量を算出し、燃焼量を、室温と設定温度で燃焼量制御手段3より決定された燃焼量から、燃焼量切り換え手段10によって平均燃焼量に切り換える構成としてある。従って、燃焼が安定できる燃焼段数が増え、最適な燃焼量を決定できるためふらつきもなくなる。



(2)

【特許請求の範囲】

【請求項1】燃料を燃焼させる燃焼部と、室内の温度を検出する室温検出手段と、所望の温度を設定する温度設定手段と、前記室温検出手段により検出した室温と、前記設定温度手段によりあらかじめ設定された設定温度との差を入力信号として燃焼量を複数段に切り換える燃焼量制御手段と、前記燃焼量制御手段により決定された燃焼量が、あらかじめ設定された燃焼量範囲以内で燃焼

(これを以後安定燃焼と呼ぶ)していることを検知する安定燃焼検知手段と、前記安定燃焼検知手段にて検知された安定燃焼が継続している期間を計時する安定確認タイマーと、前記安定燃焼期間中の単位時間当たりの燃焼量を記憶する安定燃焼記憶手段と、前記安定確認タイマーがあらかじめ設定された時間経過すると、前記安定燃焼記憶手段の情報を基に、安定燃焼中の平均燃焼量を算出する平均燃焼量算出手段と、前記平均燃焼量算出手段からの平均燃焼量の算出結果を入力してから、前記燃焼量制御手段により決定された燃焼量が、あらかじめ設定されている燃焼量範囲を越えるまで、燃焼量を平均燃焼量に切り換える燃焼量切り換え手段と、前記燃焼量切り換え手段により切り換え入力された燃焼量に従ってバーナーの燃焼量を制御する燃焼制御手段とからなる燃焼制御装置。

【請求項2】燃料を燃焼させる燃焼部と、室内の温度を検出する室温検出手段と、所望の温度を設定する温度設定手段と、前記室温検出手段により検出した室温と、前記設定温度手段によりあらかじめ設定された設定温度との差を入力信号として燃焼量を複数段に切り換える燃焼量制御手段と、前記燃焼量制御手段により決定された燃焼量が、あらかじめ設定された燃焼量範囲以内で燃焼

(これを以後安定燃焼と呼ぶ)していることを検知する安定燃焼検知手段と、前記安定燃焼検知手段にて検知された安定燃焼が継続している期間を計時する安定確認タイマーと、前記安定燃焼期間中の単位時間当たりの燃焼量を記憶する安定燃焼記憶手段と、前記安定確認タイマーがあらかじめ設定された時間経過すると、前記安定燃焼記憶手段の情報を基に、安定燃焼中の平均燃焼量を算出する平均燃焼量算出手段と、前記平均燃焼量を含む平均燃焼量範囲を算出する平均燃焼量範囲算出手段と、燃焼量を平均燃焼量範囲の下限値に切り換える燃焼量切り換え手段と、前記燃焼量切り換え手段により切り換え入力された燃焼量に従ってバーナーの燃焼量を制御する燃焼制御手段とからなる燃焼制御装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は石油温風暖房機などに用いる燃焼制御装置に関するものである。

【0002】

【従来の技術】従来、この種の石油暖房機は、図9に示すように構成されている。すなわち、図9において、1

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は暖房された室内の温度を検出する室温検出手段で、2は所望の温度を設定する温度設定手段である。3は室温検出手段1と温度設定手段2との差に応じて燃焼量を複数段に切り換える燃焼量制御手段である。

【0003】例えば設定温度が20℃であった場合、室温が21℃であれば弱燃焼に、室温が18℃であれば強燃焼に燃焼量を切り換える。又、燃焼部5は燃焼量制御手段3の出力などを基に燃焼制御手段4で制御されている。

10 【0004】

【発明が解決しようとする課題】しかしながら上記従来の構成によれば、室温サーミスタの分解能の精度が低い場合、例えば0.5℃刻みでしか検出できない室温サーミスタの場合には、強燃焼から弱燃焼までの間に燃焼段数が256段あったとしても、実際に室温と設定温度により決定される燃焼段数(燃焼が安定できる段数)は6段しか持つことが出来ない。この場合、以下のような現象が起きる場合がある。

20 【0005】ある燃焼量で燃焼を続けると室温が上昇するため、燃焼量を1段弱めに切り換える。そこで、弱めの燃焼量で燃焼を続けると、今度は室温が下がってきて、燃焼量を1段強めに切り換えねばならない。そこで強めの燃焼量で燃焼を続けると、今度は室温が上昇し、燃焼量を1段弱めに切り換えねばならない、といったことを繰り返してしまうことがある。

30 【0006】上記現象が起こった場合、いつまで経っても室温が設定温度で安定せず、室温も温度変化が大きく不快な状態になるということがある。またファンモータの回転数も燃焼量の切り換えに応じて乱れるので、うるさいといった欠点があった。これを回避するために、分解能の精度がもっと良い室温サーミスタを使用すれば燃焼が安定できる段数を増やすことができるが、コストアップするという欠点がある。

【0007】本発明は上記欠点を解決するもので、コストアップすることなく燃焼が安定できる段数を増やし、その部屋に対する最適な燃焼量を決定することにより、燃焼量のふらつきをなくし、快適な室温の安定を提供することを目的としたものである。

【0008】

40 【課題を解決するための手段】本発明は上記目的を達成するため、第一の発明では、前記燃焼量制御手段により決定された燃焼量が、あらかじめ設定された燃焼量範囲以内で燃焼していることを検知する安定燃焼検知手段と、前記安定燃焼検知手段にて検知された安定燃焼が継続している期間を計時する安定確認タイマーと、前記安定燃焼期間中の単位時間当たりの燃焼量を記憶する安定燃焼記憶手段と、前記安定確認タイマーがあらかじめ設定された時間経過すると、前記安定燃焼記憶手段の情報を基に、安定燃焼中の平均燃焼量を算出する平均燃焼量算出手段と、平均燃焼量算出手段からの平均燃焼量の算

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出結果を入力してから、前記燃焼量制御手段により決定された燃焼量が、あらかじめ設定されている燃焼量範囲を越えるまで、燃焼量を平均燃焼量に切り換える燃焼量切り換え手段を設けたものである。

【0009】また、第二の発明では上記目的を達成すると同時に、改良を加えたもので、前記平均燃焼量を含む平均燃焼量範囲を算出する平均燃焼量範囲算出手段を設け、第一の発明の燃焼量切り換え手段を、燃焼量を平均燃焼量範囲の下限値に切り換える手段を有するものである

【0010】

【作用】本発明は上記した構成により、第一の発明では前記安定確認タイマーがあらかじめ設定された時間経過すると、安定燃焼中の平均燃焼量を算出して燃焼量を強制的に平均燃焼量に切り換えるため、いつまでもある燃焼段数の間で燃焼量がふらつくことはなく、その部屋に対する最適な燃焼量を決定する。また、第二の発明では、第一の発明に加え、安定燃焼中の燃焼量は必ず平均燃焼量以下とする。

【0011】

【実施例】以下本発明の実施例を図面に基づいて説明する。従来例と同一部分は同一番号を符記して説明を省略し、異なる部分の説明をする。

【0012】第一の発明では、図1において、6は前記燃焼量制御手段3により決定された燃焼量が、あらかじめ設定された燃焼量範囲以内で燃焼していることを検知する安定燃焼検知手段で、7は前記安定燃焼検知手段6にて検知された安定燃焼が継続している期間を計時する安定確認タイマーで、8は前記安定燃焼期間中の単位時間当たりの燃焼量を記憶する安定燃焼記憶手段で、9は前記安定確認タイマー7があらかじめ設定された時間経過すると、前記安定燃焼記憶手段8の情報を基に、安定燃焼中の平均燃焼量を算出する平均燃焼量算出手段で、10は前記平均燃焼量算出手段9からの平均燃焼量の算出結果を入力してから、前記燃焼量制御手段3により決定された燃焼量が、前記平均燃焼量を算出した時の燃焼量範囲を越えるまで、燃焼量を平均燃焼量に切り換える燃焼量切り換え手段である。この燃焼量切り換え手段10または前記燃焼量制御手段3の出力などを基に燃焼制御手段4は燃焼部5を制御している。

【0013】次に上記のように構成した本実施例の動作を図2のフローチャートを用いて説明する。図2において、まずステップ20で、室温検出手段1と温度設定手段2の出力信号により燃焼量制御手段3で燃焼量（以下、現燃焼量とする）を算出する。次に、ステップ21で現燃焼量があらかじめ設定された燃焼量範囲内かどうかを安定燃焼検知手段6で判断する。もし範囲外であればステップ27で安定確認タイマー7を再設定してステップ28へ移る。もし燃焼量範囲内であれば、ステップ22で安定確認タイマーがオーバーフロー（以下OVF

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と記す）OVFしているか否かを判断し、OVFしていなければステップ23へ移る。OVFしていればステップ25で平均燃焼量算出手段9により、安定燃焼記憶手段8の情報を基に安定燃焼期間中の平均燃焼量を算出し、ステップ26で、以降は現燃焼量ではなく、ステップ25で算出された平均燃焼量で制御するために、燃焼量切り換え手段10によって燃焼量を切り換えステップ28に移る。

【0014】次にステップ23で安定確認タイマー7を計時し、ステップ24で安定燃焼記憶手段8により安定燃焼期間中の単位時間当たりの燃焼量を記憶する。次にステップ28で、現燃焼量または平均燃焼量を基に燃焼制御手段により燃焼を制御する。

【0015】上記の具体例として以下の動作を図3、図4のフローチャートを用いて説明する。

【0016】まず例として、燃焼段数が強燃焼から弱燃焼まで256段ある内、室温と設定温度により決定される燃焼段数（燃焼が安定できる段数）が6段数である時、あらかじめ設定された燃焼量範囲が6段の内2段目から3段目の範囲の場合を説明する。この場合、2段目を上限燃焼量、3段目を下限燃焼量と呼ぶことにする。

【0017】第一の発明では、図3、図4において、まずステップ30で、室温検出手段1と温度設定手段2の出力信号により燃焼量制御手段3で燃焼量（以下、現燃焼量とする）を算出する。次に、ステップ31で現燃焼量と上限燃焼量を比較する。この比較の結果により、安定燃焼しているか否かを検知する。

【0018】「現燃焼量>上限燃焼量」の場合は、2段目から3段目の燃焼量内には現燃焼量がないと判断し、ステップ32で新たな上限燃焼量として現燃焼量そのものを設定し、ステップ33で新たな2段階の燃焼量内（例えば現燃焼量が1段目であった場合には、1段目を上限燃焼量、2段目を下限燃焼量とする2段階）で、所定時間、燃焼量が安定するか否かを確認するために安定確認タイマー7をスタートさせる。この時点では、「現燃焼量=上限燃焼量」であるので、ステップ34で上限燃焼量で燃焼している時間をカウントする上限燃焼量保持タイマーをスタートさせ、ステップ46へ移る。

【0019】ステップ31で「現燃焼量≤上限燃焼量」と判断した場合、ステップ35で現燃焼量が、2段目から3段目の燃焼量に含まれるか否かを判断し、含まれないならば、ステップ36で新たな上限燃焼量を設定し、ステップ37で新たな2段階の燃焼量内（例えば現燃焼量が5段目であった場合には、4段目を上限燃焼量、5段目を下限燃焼量とする2段階）で、所定時間、燃焼量が安定するか否かを確認するために安定確認タイマー7をスタートさせる。さらにステップ38で上限燃焼量保持タイマーを再設定し、ステップ46に移る。

【0020】ステップ35で現燃焼量が2段目から3段目の燃焼量に含まれると判断した場合、ステップ39

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で、上限燃焼量保持タイマーのカウンートをストップさせ、ステップ40で安定確認タイマー7がオーバーフローしているか否かを判断する。オーバーフローしているならステップ44へ、オーバーフローしていないならステップ46へ移る。

【0021】ステップ31で「現燃焼量＝上限燃焼量」と判断した場合、ステップ41で安定確認タイマー7がオーバーフローしているか否かを判断し、オーバーフローしていないならステップ42で上限燃焼量保持タイマーをカウンアップし、ステップ46へ移る。オーバーフローしているなら、ステップ43で上限燃焼量保持タイマーのカウンアップをやめ、ステップ44で安定確認タイマー7と上限燃焼量保持タイマーの時間比率を演算部12により算出する（安定期間中の平均燃焼量を求めている）。

【0022】次に例えば2段目から3段目の燃焼量内で安定し続け、安定確認タイマー7がオーバーフローした場合を説明する。

【0023】図4においてステップ45で、例えば、算出結果が、「上限燃焼量保持タイマー＜安定確認タイマー×1/4」であった場合、所定の安定確認時間中、現燃焼量は2段目と3段目の燃焼量のうち、ほとんど3段目の燃焼量であったと判断して、燃焼量切り換え手段10で新たな燃焼量として3段目の燃焼量を設定する。もし「上限燃焼量保持タイマー＜安定確認タイマー×2/4」であった場合、その時間比から燃焼量切り換え手段10で新たな燃焼量として、「(2段目+3段目)×3/4」の燃焼量を設定する。もし「上限燃焼量保持タイマー＜安定確認タイマー×3/4」であった場合、その時間比から燃焼量切り換え手段10で新たな燃焼量として、「(2段目+3段目)×2/4」の燃焼量を設定する。もし「上限燃焼量保持タイマー＜安定確認タイマー×4/4」であった場合、その時間比から燃焼量切り換え手段10で新たな燃焼量として、「(2段目+3段目)×1/4」の燃焼量を設定する。もし「上限燃焼量保持タイマー＝安定確認タイマー×4/4」であった場合、現燃焼量はずっと2段目の燃焼量であったと判断し、燃焼量切り換え手段10で新たな燃焼量として2段目の燃焼量を設定する。

【0024】次にステップ46で、燃焼量制御手段3または燃焼量切り換え手段10で設定された燃焼量に基づき燃焼制御手段4で燃焼を制御する。

【0025】上記第一の実施例によれば、2段目と3段目の燃焼量を繰り返しているような場合でも、安定確認タイマーがオーバーフローした時点で、安定期間中の平均燃焼量を求め、2段目及び3段目のみでなく、従来構成では決して安定することのできなかった燃焼段数2.25段目・2.5段目・2.75段目のいずれかにも燃焼量を切り換え、安定燃焼できるので、燃焼が安定できる段数が増えたと言える。その結果いつまでも燃焼量が

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ふらつくということがなく、しかも2段目から3段目までを4等分した燃焼量を新たに決定できるので、最適な燃焼量を選ぶことが可能となる。

【0026】但し、上記第一の実施例の場合、安定燃焼検知手段として、「現燃焼量が2段目から3段目の燃焼量に含まれるか否かの判断」を用いているが、設定温度が変更された場合にも燃焼量が切り換わり、2段目から3段目の燃焼量範囲を越えてしまうため、安定燃焼検知手段として「設定温度の変更」を用いても上記と同じ効果が得られる。

【0027】次に、第二の発明の実施例を図面に基づいて説明する。従来例と同一部分は同一番号を符記して説明を省略し、異なる部分の説明をする。

【0028】図5において、図1に加え、11は平均燃焼量を含む平均燃焼量範囲を算出する平均燃焼量範囲算出手段で、10は燃焼量を平均燃焼量範囲の下限値に切り換える燃焼量切り換え手段である。

【0029】次に上記のように構成した本実施例の動作を図6のフローチャートを用いて説明する。

【0030】図6において、図2に加え、ステップ22で安定確認タイマーがオーバーフローしている場合、ステップ25で安定燃焼中の平均燃焼量を算出するとともに、ステップ251で平均燃焼量範囲算出手段11により、平均燃焼量を含む、平均燃焼量範囲を算出し、ステップ26で燃焼量をステップ251で求めた平均燃焼量範囲の下限に切り換える。

【0031】次に第二の発明の具体的な実施例として以下を説明する。図7、図8において、図3に加え、ステップ45で2段目と3段目の燃焼量の平均燃焼量を算出した場合、2.5段目であったとする。その場合、図3に加え、ステップ451で平均燃焼量範囲算出手段11により平均燃焼量範囲を例えば2.25段目から2.75段目と算出すると、ステップ452で新たな燃焼量として2.75段目を設定する。

【0032】上記第二の実施例によれば、燃焼量が安定している場合、平均燃焼量が2.5段目と算出されても、それより若干小さい2.75段目を強制的に新たな燃焼量として設定するので、省エネ効果を期待できる。

【0033】

【発明の効果】以上説明したように本発明の燃焼制御装置によれば、第一の発明により、コストアップすることなく安定できる燃焼段数を増やすことができ、その部屋に対する最適な燃焼量を決定することができるので、燃焼量のふらつきがなくなる。また、それに応じてファンの回転数も乱れることがなくなる。

【0034】第二の発明では、第一の発明に加え、安定燃焼中は若干弱めの燃焼量に設定されるため、省エネ効果も期待できる。

【図面の簡単な説明】

【図1】本発明の第一の実施例における燃焼制御装置の

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ブロック図

【図2】本発明の第一の実施例における燃焼制御装置のフローチャート

【図3】本発明の第一の実施例における燃焼制御装置の具体的なフローチャート

【図4】同図3のフローチャートの続きを示すフローチャート

【図5】同他の発明における燃焼制御装置のブロック図

【図6】同他の発明における燃焼制御装置のフローチャート

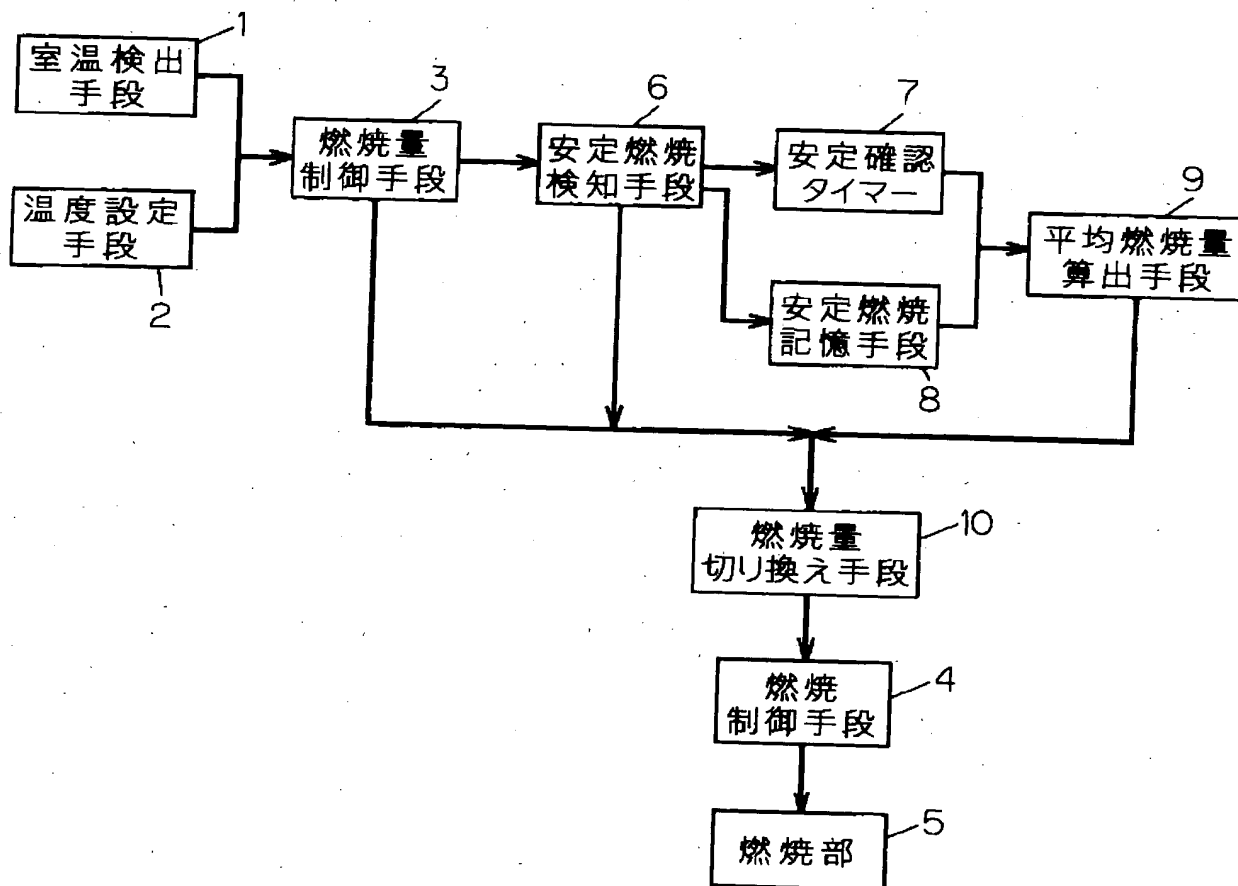
【図7】同他の発明における燃焼制御装置の具体的なフローチャート

【図8】同図7のフローチャートの続きを示すフローチャート

【図9】従来の温風暖房機の制御装置を示すブロック図
【符号の説明】

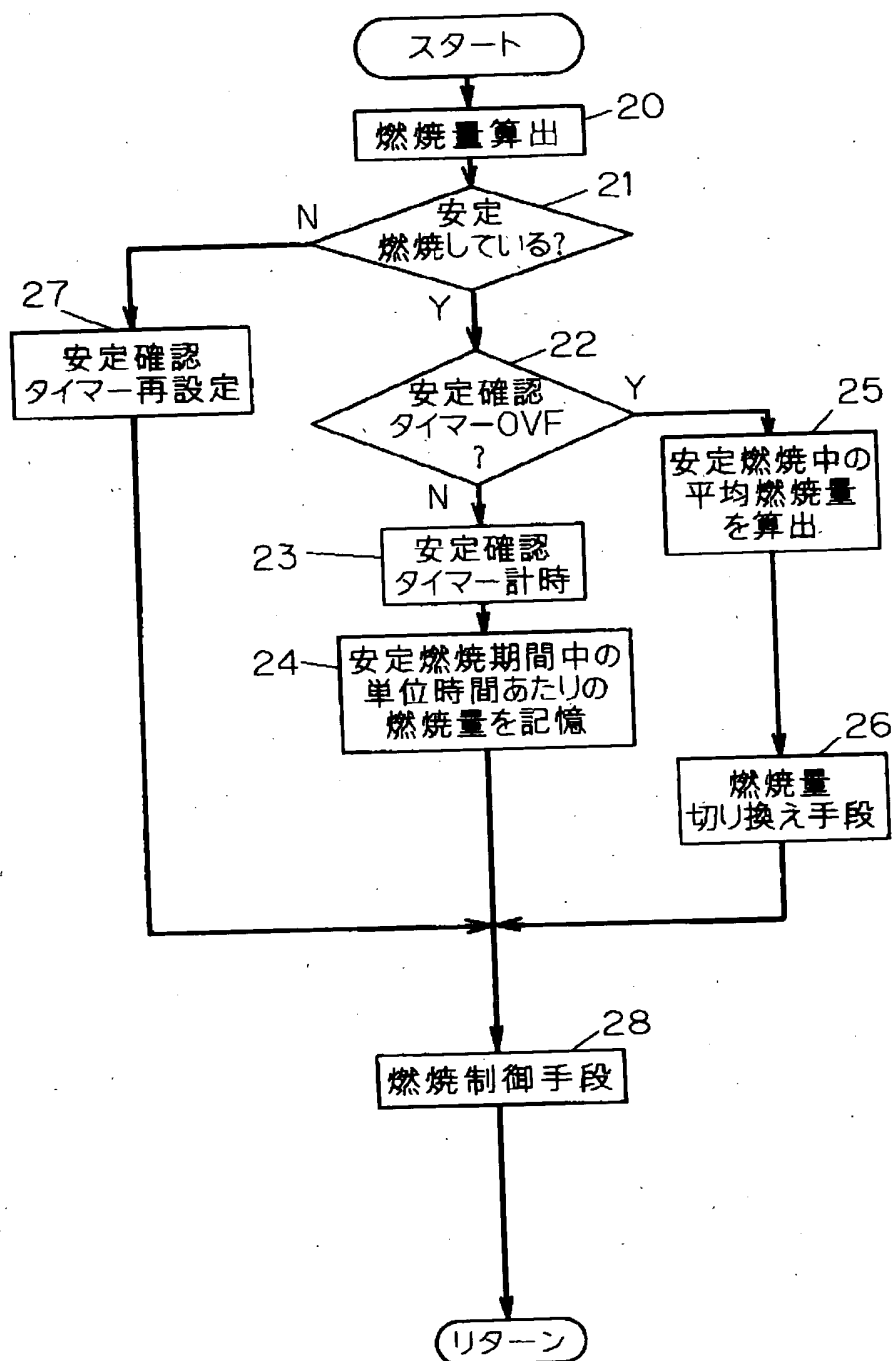
- 1 室温検出手段
- 2 温度設定手段
- 3 燃焼量制御手段
- 4 燃焼制御手段
- 5 燃焼部
- 6 安定燃焼検知手段
- 7 安定確認タイマー
- 8 安定燃焼記憶手段
- 9 平均燃焼量算出手段
- 10 燃焼量切り換え手段
- 11 平均燃焼量範囲算出手段

【図1】



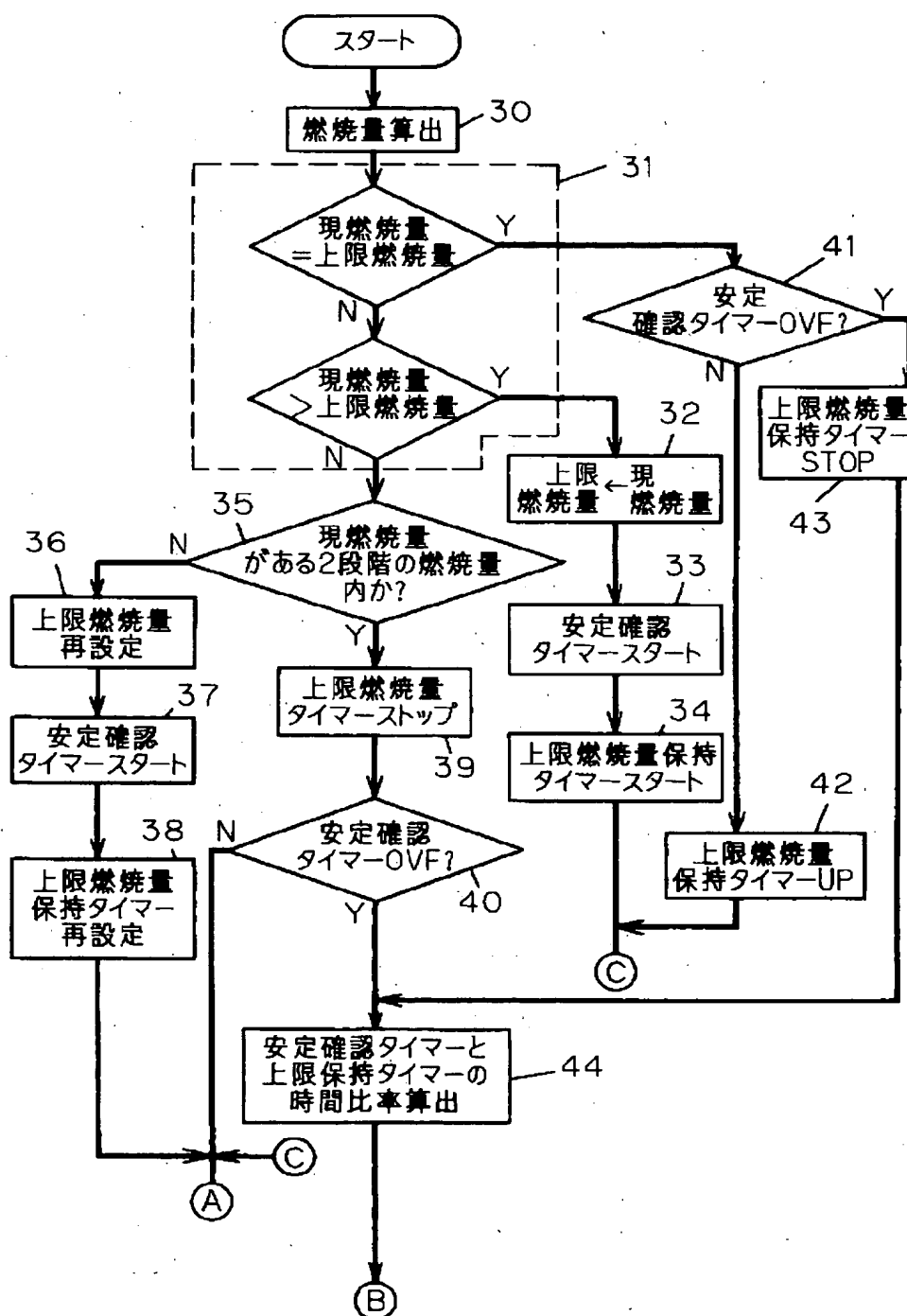
(6)

【図2】



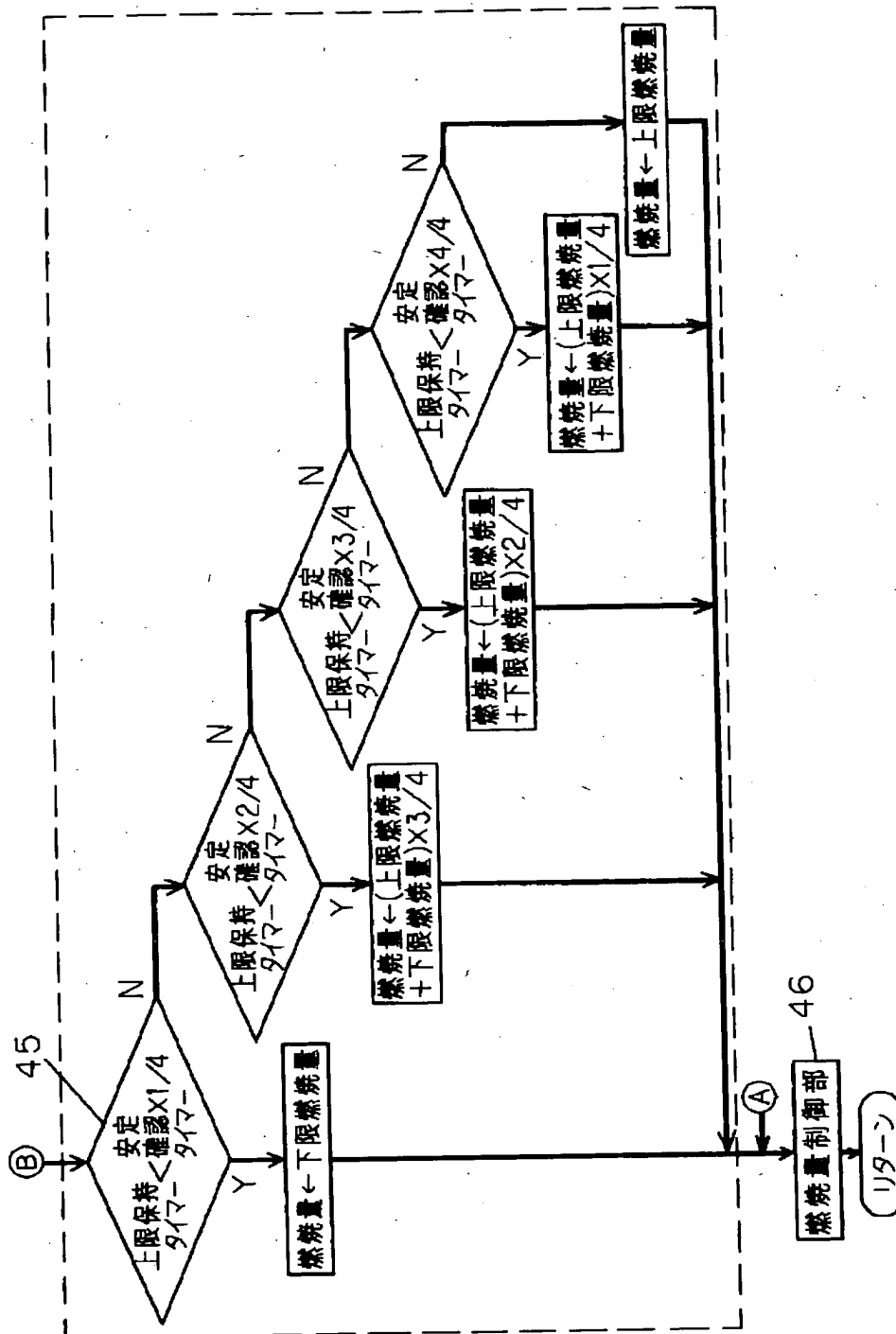
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【図3】



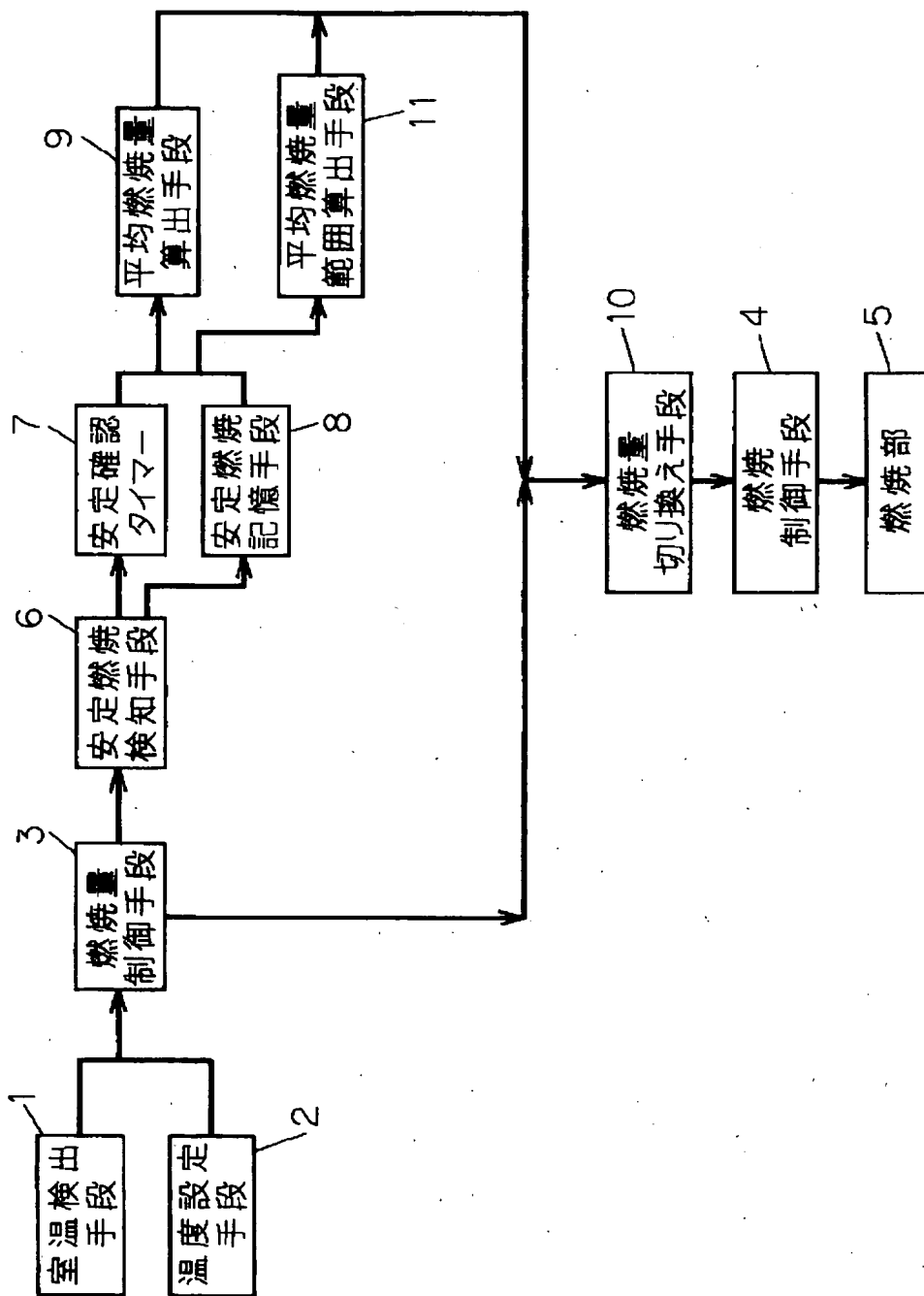
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【図4】



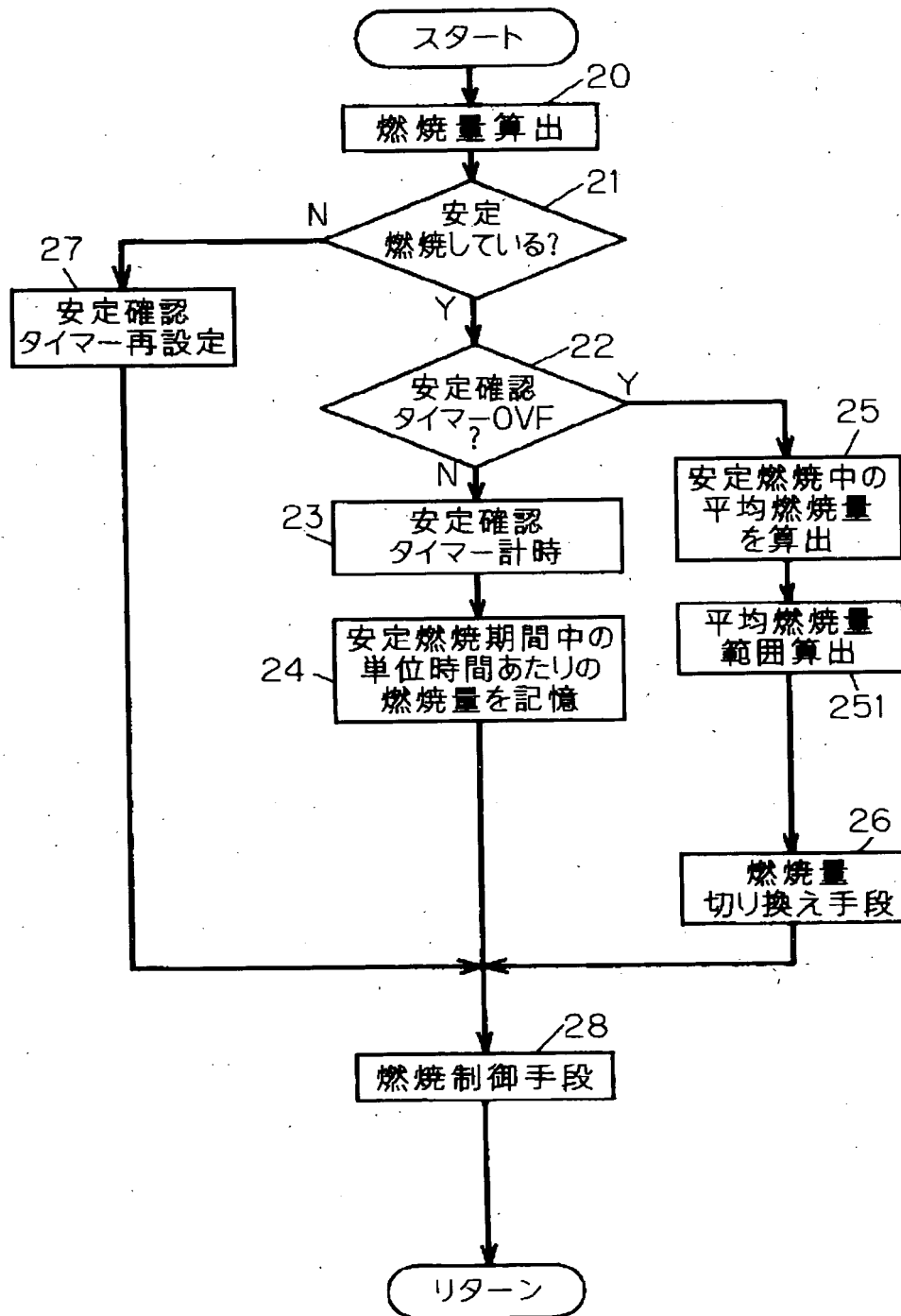
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【図5】



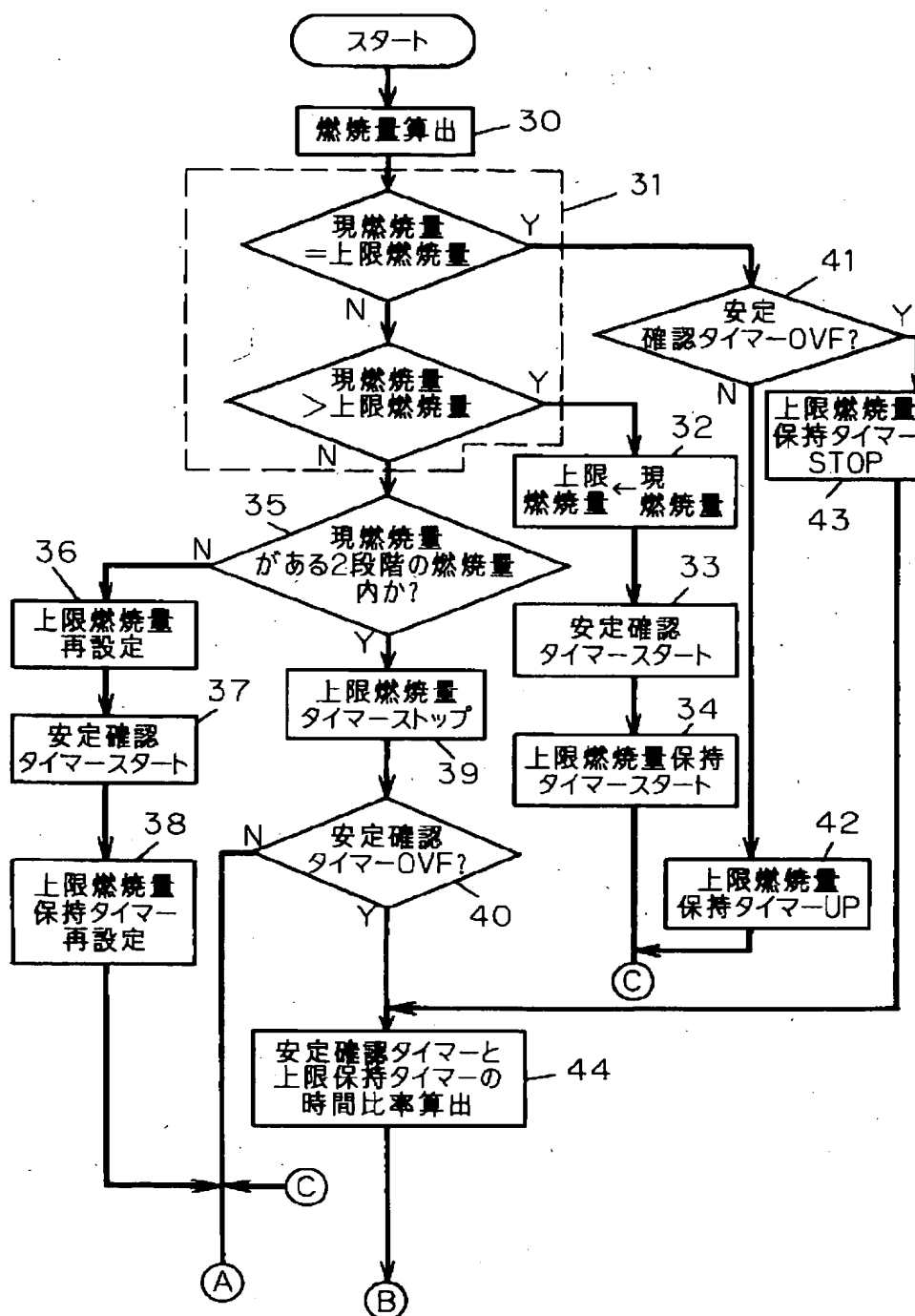
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【図6】



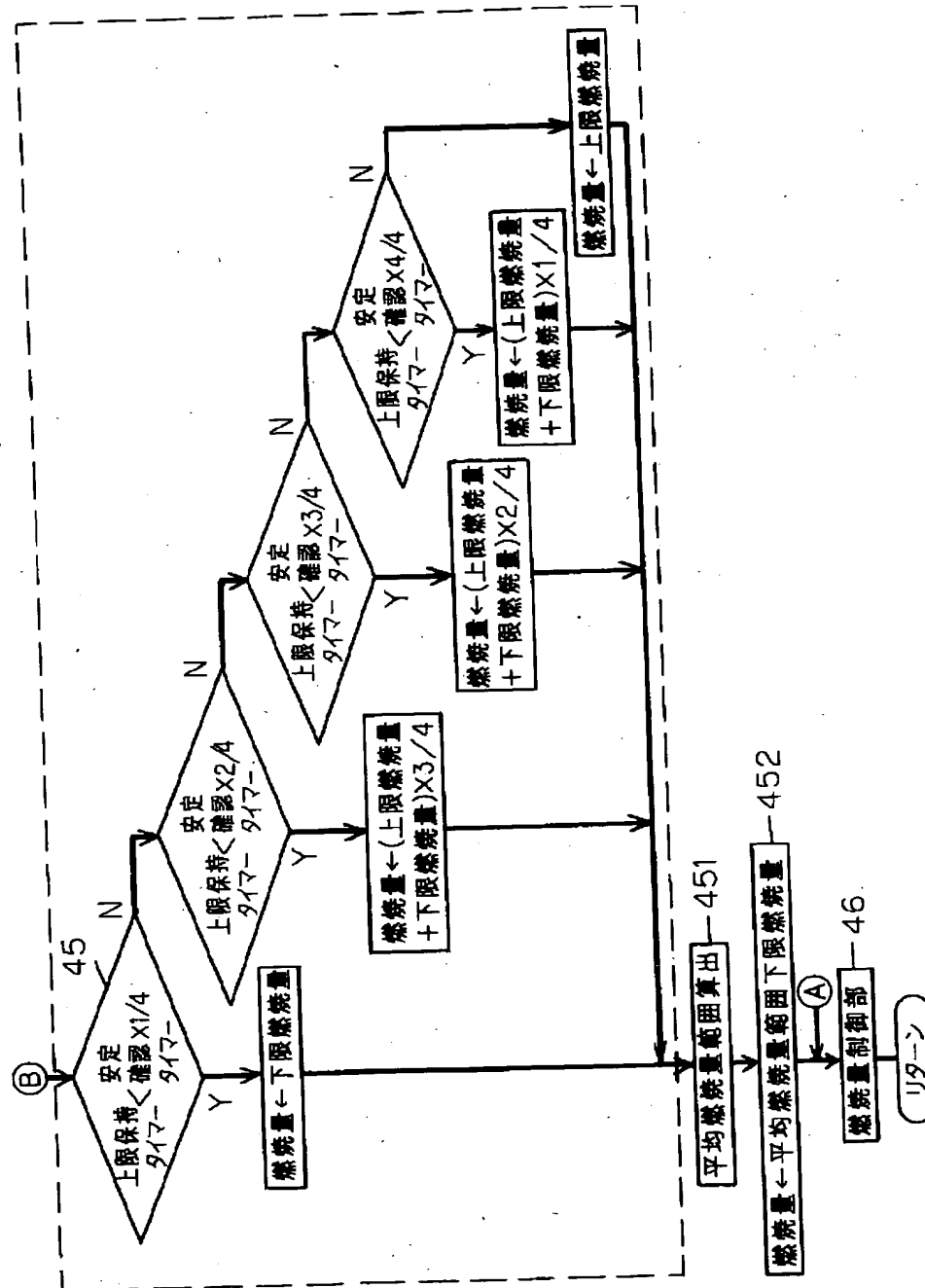
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【図7】



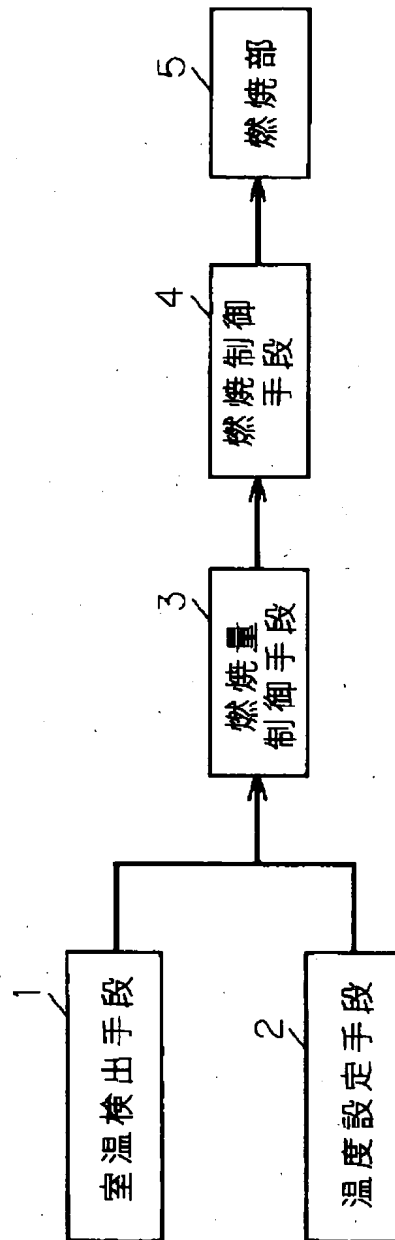
(12)

【図8】



(13)

【図9】



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